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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,040	02/18/2004	Dmitry Lubomirsky	008266/CMP/ECP	8367
44257	7590	04/05/2006	EXAMINER	
PATTERSON & SHERIDAN, LLP 3040 POST OAK BOULEVARD, SUITE 1500 HOUSTON, TX 77056			VAN, LUAN V	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/781,040	LUBOMIRSKY ET AL.	
	Examiner	Art Unit	
	Luan V. Van	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-10,12-16 and 19-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-10,12-16,19-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicant's amendment of March 2, 2006 does not render the application allowable.

The amendment is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Claims 21-22 are amended to recite the limitation of "wherein at the intermediate position the surface of the substrate is substantially parallel to the surface of the anode"; and claims 23-26 recite the limitation of "a third tilt angle". These limitations are deemed to be new matter, since the disclosure does not provide a clear indication to support these limitations. Applicant is required to cancel the new matter in the reply to this Office Action.

Status of Objections and Rejections

The rejection of claims 7, 11, 17 and 18 is obviated by Applicant's cancellation.

All rejections from the previous office action are withdrawn in view of the applicant's amendment.

New grounds of rejection under 35 U.S.C. 103(a) are necessitated by the amendments.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 21-22 and 23-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 21-22 are amended to recite the limitation of "wherein at the intermediate position the surface of the substrate is substantially parallel to the surface of the anode"; and claims 23-26 recite the limitation of "a third tilt angle". These limitations are deemed to be new matter, since the disclosure does not provide a clear indication to support these limitations.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4, 8-9, 12-16 and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al. '578 in view of Sendai et al..

Regarding claims 1 and 8, Dordi et al. '578 teach an electroplating method, comprising: loading a substrate into a receiving member (column 33 lines 33-47); tilting the receiving member to a first tilt angle measured from horizontal (column 34 lines 30-54); displacing the receiving member toward the fluid solution at the first tilt angle (column 34 lines 55-64); reducing the tilt angle to bow horizontal ones the substrate contacts the fluid solution; and tilting the receiving member to a second tilt angle or processing angle (column 38 lines 41-57) measured from horizontal when the substrate contacts the fluid solution, the second tilt angle being different from the first tilt angle.

Dordi et al. '578 differs from the instant claims in that the reference teaches positioning the substrate parallel to the surface of the anode but does not explicitly disclose tilting the anode.

Sendai et al. teach an electroplating method wherein the tilt angle is greater than 0 degrees at a time when the substrate becomes completely immersed in the fluid solution (paragraph 25); the anode is tilted from horizontal at an angle of between about

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1 and 10 degrees (paragraph 91); and the central axis of the substrate proximate is centered on the electrolyte solution (figures 11-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the anode as taught by Sendai et al., because tilting the anode would prevent air bubbles from remaining on the surface to be plated and would enhance plating uniformity.

Addressing claims 21 and 22, it would have been obvious to one having ordinary skill in the art at the time the invention was made to recognize that the intermediate position of the substrate would be parallel to the surface of the anode when the anode is tilted at an angle as taught by Sendai et al. while the tilt angle of the substrate is reduced to horizontal as disclosed by Dordi et al. '578, since the tilt angle of the substrate would overlap the angle of the anode.

Regarding claims 2 and 12, Dordi et al. '578 teach an electroplating method wherein the first tilt angle is between about 0 and 90 degrees (column 35 lines 41-48), which is within the range of the instant claim.

Regarding claims 3 and 13, Dordi et al. '578 teach an electroplating method wherein the second tilt angle is horizontal or about 0 degrees (column 38 lines 41-57).

Regarding claims 4 and 9, Dordi et al. '578 teach an electroplating method wherein the receiving member is rotated at a rotation rate of between about 0 rpm and about 200 rpm (column 38 lines 62-67).

Addressing claim 14, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al.

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'578 by tilting the substrate when the substrate is completely immersed in the fluid solution as taught by Sendai et al., because it would prevent air bubbles from remaining on the surface to be plated and prevent plating film defects.

Regarding claim 15, Dordi et al. '578 teach an electroplating method, comprising: positioning the substrate on a contact ring (column 33 lines 33-47); securing the substrate to the contact ring with a thrust plate assembly (column 33 lines 33-47); tilting the contact ring to a tilt angle of between 0 and 90 degrees (column 35 lines 41-48), which is within the range of the instant claim; vertically actuating the contact ring toward the plating electrolyte while maintaining the tilt angle (column 34 lines 55-64); rotating the contact ring at a rotation rate of between about 0 rpm and about 200 rpm (column 38 lines 62-67); reducing the tilt angle to about horizontal (column 38 lines 41-57) when the contact ring initially touches the plating electrolyte; and positioning the substrate in a processing position (column 38 lines 41-57).

Dordi et al. '578 differs from the instant claims in that the reference teach positioning the substrate parallel to the surface of the anode but does not explicitly disclose tilting the anode.

Sendai et al. teach an electroplating method wherein the tilt angle is greater than 0 degrees at a time when the substrate becomes completely immersed in the fluid solution (paragraph 25); the anode is tilted from horizontal at an angle of between about 1 and 10 degrees (paragraph 91); and the central axis of the substrate proximate is centered on the electrolyte solution (figures 11-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the anode as taught by Sendai et al., because tilting the anode would prevent air bubbles from remaining on the surface to be plated and would enhance plating uniformity.

Regarding claim 16, Dordi et al. '578 teach an electroplating method wherein the second tilt angle is horizontal or about 0 degrees (column 38 lines 41-57).

Addressing claim 20, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by maintaining the central axis of the substrate proximately centered on the electrolyte solution as taught by Sendai et al., because it would enhance plating uniformity.

Regarding claim 23, Dordi et al. '578 teach an electroplating method, comprising: loading a substrate into a receiving member (column 33 lines 33-47); tilting the receiving member to a first tilt angle measured from horizontal (column 34 lines 30-54); immersing the substrate into the plating solution (column 34 lines 55-64); and pivoting the receiving member from the first angle to an intermediate position to a second angle while maintaining the substrate immersed in the plating solution (column 38 lines 24-26).

Dordi et al. '578 differs from the instant claims in that the reference teach positioning the substrate parallel to the surface of the anode in the horizontal position but does not explicitly disclose tilting the substrate to a third angle.

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Sendai et al. teach an electroplating method wherein the tilt angle is greater than 0 degrees at a time when the substrate becomes completely immersed in the fluid solution (paragraph 25); the anode is tilted from horizontal at an angle of between about 1 and 10 degrees (paragraph 91); and the central axis of the substrate proximate is centered on the electrolyte solution (figures 11-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the substrate to a third angle as taught by Sendai et al., because tilting the substrate would prevent air bubbles from remaining on the surface to be plated, thus enhancing plating uniformity. It would have been obvious to one having ordinary skill in the art at the time the invention was made to recognize that the intermediate position of the substrate would be parallel to the surface of the anode when the anode is tilted at an angle as taught by Sendai et al. while the tilt angle of the substrate is reduced to horizontal as disclosed by Dordi et al. '578, since the tilt angle of the substrate would overlap the angle of the anode.

Addressing claim 24, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the anode as taught by Sendai et al., because tilting the anode would prevent air bubbles from remaining on the surface to be plated and would enhance plating uniformity.

Regarding claim 25, Dordi et al. '578 teach the anode is not tilted (figure 6).

Regarding claim 26, Dordi et al. '578 vertically displacing the substrate while the substrate is immersing inside the plating solution (column 39 lines 12-16).

Claims 5, 6, 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al. '578 in view of Sendai et al., and further in view of Wang et al.

Dordi et al. '578 and Sendai et al. teach the method as described above. The difference between the reference to Dordi et al. '578 and the instant claims is that the reference does not explicitly teach oscillating the substrate.

Wang et al. teach that it is desirable "to vibrate the substrate, e.g., substantially vertically and/or horizontal [sic], relative to the electrolyte solution" (paragraph 81) in order to "enhance the fluid flow of the electrolyte solution into the features contained on the plating surfaces."

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 and Sendai et al. by vibrating or oscillating the substrate as taught by Wang et al., because it would enhance the fluid flow of the electrolyte solution into the features contained on the plating surfaces, and because it would enhance metal film deposition rate within the features.

Response to Arguments

Applicant's arguments have been fully considered but they are not persuasive.

In the arguments presented on pages 6-8 of the amendment, Applicant suggests that Dordi et al. '578 and Sendai et al. do not disclose every limitation of the amended claims. The examiner agrees, and thus the rejections under 35 U.S.C. 102(e) have been withdrawn. New rejections under 35 U.S.C. 103(a) are therefore appropriate.

Applicants' arguments with respect to the rejections under 35 U.S.C. 103(a) using Sendai et al. as the base reference have been considered but are moot in view of the withdrawal of the rejections.

In response to applicant's argument on page 8 that there is no suggestion to combine Dordi et al. '578 and Sendai et al., the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As the Court of Appeals for the Federal Circuit has stated, there are three possible sources for motivation to combine references in a manner that would render claims obvious. These are: (1) the nature of the problem to be solved; (2) the teaching of the prior art; and (3) the knowledge of persons of ordinary skill in the art. In *re Rouffet*, 47 U.S.P.Q.2d 1,453, 1458 (Fed. Cir. 1998). In this case, the nature of the problem to be solved is to electroplate a uniform and void-free metal on the wafer substrate. The references are all directed to a method for tilting the substrate in order to minimize the formation of bubbles on the surface of the substrate. Therefore, the

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combination of these references are deemed proper. The examiner believes that he has met the requirement for a prima facie case of obviousness.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

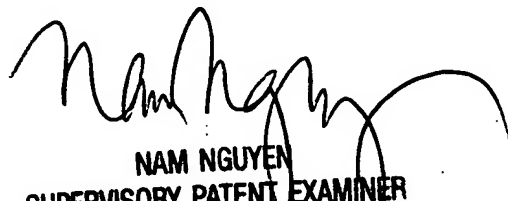
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LVV
3/28/2006



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